Symons's

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OUR NEW VOLUME.

In commencing the Forty-third Volume of this Magazine, the eighth under the present editorship, we look back with some satisfaction to a steady, if slow, growth in the number of readers. The circulation of the Magazine has doubled within the last ten years, and as we were assured by "practical men," both publishers and newsagents, eight years ago, that it had already reached the limit it was reasonable to expect, we are satisfied that this not having been the case then is not the case now. The difficulty of inducing newsagents to place on sale a Magazine from which they cannot expect to make a large profit is insuperable, and the expense of advertising is prohibitive, so we must trust to the good-will of present readers for the gradual percolation of a knowledge of our existence through the mass of people who do not care until it reaches one by one the quite considerable number who would welcome the information. We will gladly supply specimen copies of back-numbers of the Magazine to anyone who would care to distribute them; and we take this opportunity of reminding our readers generally that all observers of rainfall who desire so far to assist our work should send their subscriptions direct to the Editor, at 62, Camden Square, London, N.W., while other members of the public can only be supplied through booksellers or the publisher.

We have long felt some doubt as to the desirability of publishing in our Tables the records of temperature sent by rainfall observers. Many observers have instruments of the highest accuracy and their records are absolutely trustworthy; but regarding others we have no information, and the erratic and contradictory readings of some of the thermometers have occasionally caused us much trouble. We have often wished to return to the system formerly followed, by which a concise account of the temperature and other weather conditions of the month was contributed by a correspondent specially skilled in such work. We are now happy to have secured the co-operation of Mr. F. J. Brodie, of the Meteorological Office, and this month we publish the first of his articles. With such a summary the temperature data of our table become less important, and we are

glad to reduce the width of the pages occupied by the rainfall table to their normal dimensions, thereby saving unsightliness in the bound volumes, the margins of which are often shorn too close.

We have it in our mind also to publish each month a rainfall map of the country around London, embracing the whole basin of the Thames; but we have not yet been able to overcome some technical difficulties as to the production of a map which cannot be drawn until immediately before publication. Next month we may have something farther to say on this subject, and meanwhile we beg any rainfall observers in the Thames Valley, who do not already report to us monthly, to apply for the special postcard forms, which will be willingly forwarded for that purpose.

BLACK RAIN IN IRELAND, OCTOBER 8th–9th, 1907.

By Dr. Otto Boeddicker.

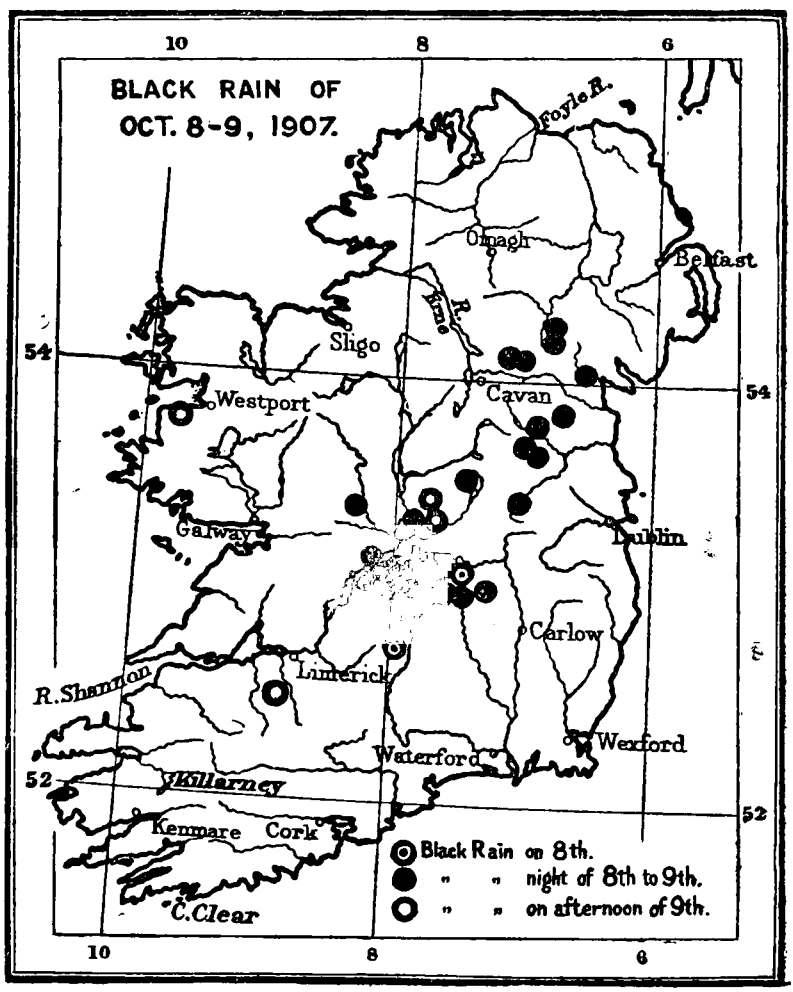
At 12.30 p.m. on the 8th October, a very heavy and threatening cloud approached Birr, from the S.E., its colour was blackish-brown, and it discharged rain over Birr in the early afternoon. This rain was not discoloured; there are, however, two records of black or soot-impregnated rain during that afternoon. The one comes from Roscrea, where my informant who attended the cattle fair in that town noticed "during the afternoon" a shower of black rain. The other comes from a place near Thurles, in Tipperary. There the rain-water was being collected in a tub—it is mentioned as "lovely clear,"—when at 5 o'clock p.m., "suddenly a very heavy shower that did not last long," came down and turned the water in the tub quite black. The blackness of the rain was also noticed as it fell.

The next information reached me on the morning of the 9th. The rain-water in the Birr Castle gauges was discoloured, and the water standing in pools on the roads to the S., S.E., and E. of Birr, was black, or, as I was told by one observer, "inky." On the other hand, a gentleman cycling at 7 a.m. on the 9th to Banagher, ($7\frac{1}{2}$ miles from Birr to the N.N.W.) though he noticed the water standing on the road, is positive that the pools were not black. A letter sent to the *Irish Times* by Lord Rosse inviting further observations produced a large number of replies, which may be summarized as follows:—

The records extend in the direction S.W. to N.E., from Roscrea, in Tipperary, to Keady, in Armagh, just on the border of Monaghan; in the direction S.E to N.W., from half-way between Athy and Abbeyleix, in Queen's County, to Ahascreagh, near Ballinasloe, in East Galway. Absolutely the most eastern station is 2 to 3 miles east of Dundalk, in County Louth. As evidently the absence of communication does not necessarily imply an absence of black rain, we can thus only conclude that the greatest width of the soot-laden cloud as it approached from the S.E. was not less than, roughly, 110 miles. In the absence of any definite observations as to the

time of the fall nothing can be ascertained with regard to the breadth of the cloud in the direction S.E. to N.W. It is, however, worth noting that at Killart, near Clonaslee, in Queen's County, a "most peculiar and disagreeable smell in the air" was noticed at 6.30 to 7 a.m. on the 9th. As the same smell was perceived in the afternoon on the same day, immediately after a fall of black rain (to be mentioned later), it is reasonable to suppose that near Clonaslee the fall took place shortly before 6.30 a.m., on the morning of the 9th.

The amount of soot deposited seems to have been very different in different places. As mentioned before, it was greater to the S.E. and E. of Birr than to the N.W. Again; it was very considerable in Meath and Westmeath—evidently greater than near Birr—and the records from Monaghan also speak of "a very heavy fall." As



to the specific effects of the black rain it is most generally mentioned that rain-water tanks had to be emptied and cleaned. At Lynbury, near Mullingar, the deposit of soot in a recently cleaned tank was sufficient to choke a half-inch pipe. Clothes hung out to bleach were blackened in many places. Near Drum, Co. Monaghan, it took two washings to restore them to their original colour. In Keady, Co. Armagh, the clothes were found to be covered with "smuts," suggesting discrete particles of soot rather than a general stain observed elsewhere; at Gurteen (6 miles S.W. of Birr), for instance, "clothes were still of a bad colour after the second washing." From Dundalk, on the other hand, it is reported that "one washing easily removed the stain." In Arraghmore (1½ miles N.N.W. of Gurteen), sheep were blackened; from Nobber, Co. Meath, some leaves of a lime tree were sent to me by Mr. P. Condra, which are thickly coated with soot, suggesting a very heavy fall. Nobber is 20 miles distant from the east coast, and it is worth mentioning that Mr. Condra writes that black rain "is not a very unusual occurrence when the wind blows east." I should add, finally, that nearly all stations report sheet-lightning during the night of the 8th to the 9th.

The next and last observations of a soot-laden cloud and black rain were made in the afternoon of the 9th October. The cloud approached Birr from E.S.E., about 2 o'clock p.m. At 3 the sky was darkened to such an extent that lamps had to be lit; at 3.30 it began to rain, certainly *not* black, with lightning and two peals of thunder about 4 o'clock, towards the west. Sheet-lightning was noticed till late in the evening. This cloud moved in a north-westerly direction, and discharged *black* about 4 p.m., at Rathcabbin, 6 to 7 miles from Birr, also about the same time on the east coast of Lough Derg, not far from Portumna. At Killart, Clonaslee, about 15 miles to the east of Birr, black rain fell in the afternoon, followed by a disagreeable smell (as mentioned before). This is thus the only place from which black rain is reported as having fallen both during the night preceding and on the afternoon of the 9th. At Coolatore, Moate, Co. Westmeath,—N.N.E. of Birr—the rain in the gauge was found to be black on the 10th, "when measuring rainfall for previous day." From Clara, only a few miles distant from Moate, I am informed that "the rain-water which fell here on the 9th was blackish." At Croagh, 12 miles from Limerick, toward the S.W., black rain fell about 2 o'clock p.m., on the 9th, which seems to indicate that the cloud extended essentially like the previous one, from S.W. to N.E., and that its greatest width cannot have been less than 80 miles. The last tidings of this cloud reached me from Faelduff, 12 miles to the west of Westport, where it again discharged black rain "much darker than bog-water."

Thus we have here evidence of a soot-laden cloud, originating probably in South Wales, crossing the channel and the whole of Ireland, and disgorging its soot into the Atlantic.

ROYAL METEOROLOGICAL SOCIETY.

THE annual general meeting of this Society was held on Wednesday evening, January 15th, at the Institution of Civil Engineers, Great George Street, Westminster, Dr. H. R. Mill, President, in the chair.

The Council, in their report, expressed their pleasure at the marked and increasing interest which is being taken in the science of meteorology throughout the country. The lectures and exhibitions inaugurated by the Society are bearing fruit, and that the efforts of the Society are appreciated is shown by the large increase in the roll of the Fellows, who now number 732.

After the report had been adopted and the usual votes of thanks passed, the President presented the Symons Memorial Gold Medal to Monsieur Léon Teisserenc de Bort, of Paris, it having been awarded to him by the Council, "in consideration of the distinguished work which he had done in connection with meteorological science, especially the study of the upper air," and M. Teisserenc de Bort, in replying, gave expression to his high esteem of Mr. Symons, whose work the medal commemorates.

The President then delivered an address on "Map-Studies of Rainfall." He said that the special problem which he had before him was to determine the normal annual rainfall of the British Isles in relation to the general configuration of the land, and to ascertain how the rainfall of individual years and months, and even of the constituent showers was related to the normal. The most useful method of working towards this end is by the preparation and study of maps of rainfall. He described the methods which he adopted in preparing annual, monthly, and daily maps of the distribution of rainfall. He dwelt upon the remarkable fact that while heavy cyclonic and thunderstorm rains fell equally on high or low ground, on land or on sea, with a complete disregard of the surface features, the total rainfall for a year—and, still more, the average annual rainfall—showed the closest relationship with the configuration of the country.

Dr. Mill, in conclusion, said:—It happens that rainfall is not only the most difficult of all the meteorological distributions to map accurately, it is also that one which is of the greatest importance, for by rain the rivers are fed, and the rivers both water and drain the land. Every year makes clearer the vast national importance of accurate knowledge of the rainfall of a country, for the problem of the rivers is becoming acute. The growing populations of the great towns are tapping the upper waters and diverting the water from its natural channels, and at the same time they are polluting the lower courses with the waste of the factories and the streets. Toll is taken all along the banks of industrial streams for raising steam and carrying on the multitudinous processes of manufacture. There is sometimes anxiety as to whether the waterways can be kept sufficiently supplied to float the water-borne traffic or to fight the silting

action of the tides, and there is growing alarm as to the possibility of fish traversing the depleted and polluted streams to reach their spawning beds. Of recent years the value of the water-power which may be generated in the lonely and lofty places amongst the western heights of Great Britain, where the rainfall is large and unfailing, has been recognised, and chemical works for the production in electrical furnaces of what a few years ago were rare substances are becoming familiar features in Wales and the Highlands. In Ireland, too, the rainfall is an unrecognised source of wealth, which as yet has not been drawn upon to any appreciable extent. The increasing strenuousness of the struggle for the possession of large water-supplies is producing in England, and especially in Wales, a great amount of local jealousy and strife, for the boundaries of parishes and counties coincide but rarely with water-partings; and the argument has been brought forward again and again that the rainfall of one county should not be diverted for the use of the inhabitants of another. The feeling is intensified when the boundary to be crossed is that of a historical division of national importance, like the boundary between England and Wales; but I think that the map-study of rainfall can do something to suggest the lines on which such disputes should be settled. Although the exceptional deluges of a thunderstorm or a great depression fall with equal and impartial heaviness on the hills of the west or the flat plains of the east, the common every-day rains are precipitated on the high lands and in the mountain valleys which cross the track of the prevailing wind in much greater abundance than on level and low stretches of country. Most of the rain is borne to our islands from the Atlantic, and when it comes torrentially it is of the air, and no boundary checks it; the largest amount however comes down on and near the high watersheds, because there the land produces its maximum influence as a rain-compeller.

From the high ground the rivers seek the plains, carrying off the excess of rainfall into the less liberally watered districts. The Dee, the Severn, the Wye and the Usk restore to England part of the rains which the Welsh mountains have abstracted as the air passed over them. The high rainfall of the whole Pennine district, sometimes by circuitous routes across the comparatively dry plains of the east, swells the volume of fresh water that pours into the Humber. The Thames itself receives the comparatively high rains of the Cotteswolds, the Chilterns and the Downs, and forwards the water slowly through less and less rainy districts, until it reaches the sea in the driest part of England. Thus, I think, at least as good an argument can be drawn from this consideration of physical geography in favour of supplying the great towns of the east from the large precipitation of the west, as can be drawn in the opposite sense from the artificial divisions of political geography. It seems to me that care for the water-supply of the country, coming as it does from the air that knows no bounds, across the land, is by no means a parochial

but in the fullest sense a national matter, and should be dealt with in the interests of the nation as a whole; the units of sub division, when such are required, being the natural units of river-basins.

A hearty vote of thanks was given to Dr. Mill for his services as President, and also for his address.

The following were elected as the Council for 1908 :—

President, Dr. H. R. Mill; *Vice-Presidents*, Mr. R. Bentley, Mr. W. H. Dines, F.R.S., Mr. E. Mawley, and Dr. W. N. Shaw, F.R.S.; *Treasurer*, Dr. C. Theodore Williams; *Secretaries*, Mr. F. C. Bayard and Mr. H. Mellish; *Foreign Secretary*, Dr. R. H. Scott, F.R.S.; *Councillors*, Mr. W. W. Bryant, Capt. W. F. Caborne, C.B., Capt. M. H. Clarke, Mr. R. H. Curtis, Dr. H. N. Dickson, Mr. F. Druce, Mr. W. Ellis, F.R.S., Capt. M. W. C. Hepworth, C.B., Mr. R. Inwards, Mr. B. Latham, Mr. R. G. K. Lempfert and Capt. D. Wilson-Barker.

During the evening the following were elected Fellows of the Society :—Mr. C. J. Barker, Mr. E. S. Currey, M.Inst.C.E., Rev. R. P. Dansey, Mr. C. E. J. Esdaile, J.P., Mr. M. T. Foster, Mr. E. Gold, M.A., Rev. G. R. Hadow, Mr. J. R. G. Jones, Mr. J. J. Kermode and Miss C. Marshall.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

THE BLACK BULB.

I HAVE lately been reading a discussion of observations made with the "solar maximum thermometer," an instrument that, for various reasons, may fairly be called the *bête noire* of the meteorologist. It has occurred to me that some of your readers, learned in the history of meteorological measurements, could give information, of considerable interest to those whose historical knowledge is less complete, about that instrument.

The particular point to be elucidated is whether before the introduction of the black bulb in vacuo, observations were taken with a thermometer that had its bulb blackened, but was not sheltered by a vacuum jacket. Such observations would be of considerable climatic interest, because the conditions of exposure would be similar to those of natural objects. A pedestrian in a frock coat and a silk hat is a walking example of a black bulb not *in vacuo*, just as the same gentleman in the shade, with his coat off, is the personification of the wet bulb. Many vegetable products are also exposed to the sky in varying aspects, but no one is expected to occupy a vacuum either in sun or shade.

I can understand that a vacuum jacket might have been considered an essential improvement when it was supposed that the solution of

questions on the intensity of solar radiation and atmospheric absorption could be effectively approached in that way; but the result of experience has been to disclose many serious difficulties in the use of the instrument for that purpose, and other methods are now being advocated.

But if the vacuum does not enable us to reach the sun, it separates us effectively from the mundane conditions that represent climate. I do not venture to strain the patience of your readers by asking them awkward questions about the real significance of a reading of the black bulb *in vacuo*, but merely to say that some of the practical difficulties of the *bête noire* would disappear if the vacuum jacket were discarded, and the usefulness of the instrument for the comparative purposes of climatology might be not less, though the observations would be, of course, on a different plane as regards the physical processes involved.

But a previous generation may have already exhausted the possibilities of a black bulb not *in vacuo*, and the comparison of its results for, say, Fleet Street, Margate, Oxford and Valencia—not to go beyond the British Isles. If that is so, I feel sure some of your readers will know it, and will not be unwilling to give you references to the records of the observations and the discussion of the results.

W. N. SHAW.

10, Moreton Gardens, S.W., Jan. 11th, 1908.

A WHITE RAINBOW (?)

AN unusual phenomenon was seen here on Sunday, February 2nd, *viz.*, a bow of light, *not* a rainbow, but in the position where a rainbow would have been, *i.e.*, opposite to the sun, on a film of cirrus cloud. This was at 9.15 a.m. The bow was of pale white light, which a faint tinge of apricot colour along its outer edge. It was just discernable at 11 a.m. on cirro-cumulus cloud, and again was very clearly visible at 1.35 p.m. on a nearly pure blue sky. It was a pleasant, mild sunny day, but so calm that one could not tell to what quarter the weathercock should have pointed!

H. A. BOYS, F.R.Met.Soc.

North Cadbury Rectory, Somerset, February 3rd, 1908.

THERE was visible here on Sunday afternoon what I had not seen before, *viz.*, a white bow in the place of a rainbow. It was reflected on rather dim cirrus cloud. I don't think any downfall was taking place.

It was a still, bright day, the rest of the sky being quite clear, and the thermometer just down to 32° in the shade. It was visible at 2 o'clock for about half-an-hour, and again from 3 to 3.20—the sky having cleared a little during the interval.

C. B. GOODACRE.

The Vicarage, Thornton Curtis, Ulceby, February 4th, 1908.

THIS forenoon, from 9.30 till 12, there was a beautiful bow in the position of a rainbow, though hardly coloured at all. It appeared to be formed on filmy stratus. It was not a fog-bow, which I have seen several times. What name would you give it? I have never seen it before, and perhaps you may have other notices of it.

CHARLES P. HOOKER.

Dollarward House, Cirencester, Feb. 2nd, 1908.

FROM other communications we have received it is evident that the phenomenon referred to above was visible in many parts of the country. It was reported from several places in Wiltshire, Somerset, Gloucestershire, Worcestershire, Staffordshire, and Yorkshire. A correspondent of the "Yorkshire Post" quotes the following explanation from an article by the late Prof. P. G. Tait :—

"The overlapping of the colours in the rainbow, due to the apparent size of the sun's disk, is occasionally so greatly exaggerated that only faint traces of colour appear. This may happen, for instance, when the sun shines on raindrops in the lower strata of the atmosphere through clouds of ice-crystals in the higher strata. By reflexion from the faces of these crystals, the source of light is spread over a larger spherical angle, and there is no sharp edge to it as in the case of the unclouded disc. The rainbow is then much broader and fainter than usual, and nearly white."

WANTED! A NAME.

I DON'T see that we are shut up to the "non possumus"-tic view of Mr. Denning. Change is, no doubt, rather difficult and slow; but there are examples of its being achieved. Thus, Lord Kelvin, in early days, was made Professor of "Natural Philosophy"; but few call "Physics" that now, though the change has brought in "physicist" (a vile word). One rarely hears of "Galvanism" nowadays; and "Hypnotism" has displaced the old "Mesmerism" (with "Animal Magnetism" and "Electro-biology").

If meteorologists in council were to sanction a change to "Aerology," or other name, I should not wonder if it were taken up willingly.

A. B. M.

[We believe that "Natural Philosophy" is still the formal title of the Chairs of "Physics" in the Universities of Oxford, Cambridge, St. Andrews, Aberdeen, Glasgow, Edinburgh and Dublin; and we see no reason why anyone should want to change the old and honourable name of Meteorology. Certain critical persons desired to change the name of oxygen when acids were discovered without that element in their composition, but few chemists now trouble themselves about the matter.—ED. *S.M.M.*]

ON THE LEARNING OF METEOROLOGY.

By L. C. W. Bonacina.

It would be difficult to assign to meteorology its proper place in the classification of the sciences, and to decide whether it should be ranked among the more deductive sciences of Natural Philosophy, or the more inductive sciences of Natural History. In so far as it endeavours to discover and trace the relationship of cause and effect in the phenomena of the weather, and to explain these phenomena qualitatively and quantitatively, meteorology is a branch of physics; in so far as it merely observes, records, and compares them, it may be considered a branch of natural history. Meteorology may best, perhaps, be regarded as in the transition stage between natural history and natural philosophy.

The popular conception of meteorology is, no doubt, that of an inexact science, which for all practical purposes it certainly is. If, however, we could obtain a sufficient number of simultaneous observations from all parts of the Earth's atmosphere, that is to say, know something of the conditions of the atmosphere in all these parts, we could (if our knowledge of the laws of thermo-dynamics is sufficient, as I imagine it to be) go far towards rendering a complete explanation of weather, as well as issuing a forecast of it for long periods in advance; whence we see how the phenomena of meteorology are the proper subject-matter of natural philosophy or physics. But it is precisely the lack of such observations that prevents us from carrying meteorology farther than the natural history stage.

Notice, however, the great difference between meteorology regarded as a natural history science, and a highly inductive science like biology, for instance.

Given sufficient information respecting the conditions of pressure, temperature and humidity, etc., in different strata of the atmosphere over a wide enough area, you could, upon the basis of the laws of physics, calculate, if not to a nicety, at all events to an approximation, how much rain will fall, or may be expected to fall, over the area of London within a specified period of the near future. But no number of data relating to the physiological or chemical condition of your favourite terrier, would enable you to predict (supposing, for the sake of argument, that you were forgetful of his habits and temper, except that he was a normally constituted animal) whether, on seeing your friend, he will take it into his head to snap at your friend's leg with a hostile growl of disapproval, or to jump up with a wag of his tail and expect from him a friendly act of recognition. Or, again, plant an acorn in known conditions of soil and climate; though you might, from the general character and health of the acorn, and of the parent tree, be able to foretell to some extent whether it would germinate, or even into what kind of an oak it would probably develop, the most complete and comprehensive data relative to your acorn, would, in the present state of knowledge,

avail you nothing for the purpose of endeavouring to deduce therefrom the individuality of the future tree, that is to say, those qualities and attributes which will distinguish it, not only from all existing oaks, but from all past and future ones. And this because the biological sciences are still, as compared with the physical and mathematical, in an early inductive stage; we are, so to speak, for the most part engaged in learning their language by laborious processes of observation and experiment; whereas in the case of physics, the language is so far already learnt as to render the sciences included under that term more largely deductive for many purposes.

As Huxley well put it in his essay, "On the Educational Value of the Natural History Sciences":—"The mathematician deals with two properties of objects only, number and extension, and all the inductions he wants have been formed and finished long ago. He is occupied now with nothing but deduction and verification."

"The biologist deals with a vast number of properties of objects, and his inductions will not be completed, I fear, for ages to come; but when they are his science will be as deductive and as exact as the mathematics themselves."

Having tried to show the present relationship which meteorology bears towards the so-called inductive and deductive sciences, let me now pry into the main channels through which a knowledge of the atmosphere may be acquired.

The three great channels of revelation which are slowly, but surely, building up the science of meteorology are (1) the study by direct personal observation of weather, sky and atmosphere; (2) the study of statistics; (3) the study of atmospheric physics.

As regards No. 1, it is, of course, needless to remark that in meteorology, as in every branch of natural science, accuracy and persistency of observation of the phenomena of which it treats is of paramount importance and the fundamental requisite. Every public-schoolboy knows the hopelessness of trying to learn the rudiments of chemistry out of a book. He may take up the most clearly illustrated and plainly-worded text-book extant, and read that the addition of hydrate of ammonia to the aqueous solution of certain salts of iron will produce a red-brown precipitate of a hydrated oxide of iron; but unless he has seen this simple experiment performed, or better still performed it himself, and photographed on his memory, so to speak, the appearance of the precipitate, its precise colour, texture and consistency, he has acquired no true knowledge—has only learnt so many words evoking so many ill-defined and second-hand mental images. And so it is with meteorology; the student of which must above all be an acute and accurate observer. A striking example as to the inextricable confusion into which persons not trained to scientific habits of observation, may be led by the use of words to which they attach no very sharply-defined and definite ideas forced itself upon my notice not long ago. I was standing one muggy afternoon in the middle of last autumn at the margin of an extensive

tract of woodland on the borders of Middlesex and Hertfordshire, when I heard a lady, who was passing by with her child, exclaim, "Look at the frost on the grass. How extraordinary!" Now this lady doubtless knew what she saw, and if she chose to call it "frost" that was no affair of mine; but a minute's inspection might have brought home to her the difference between what she then saw in her superficial glance upon the ground, namely, pearly drops of water on the blades of grass, and the frozen dew or hoar-frost which (supposing she had lived in England) she must have seen times without number, but had probably never once *looked at*. But to pass on. Meteorology is the science of the "pure air and the bright heaven"; consequently, the true meteorologist will spend as much time as he can in the open air, preferably in the country, where he may behold the varying complexions of the sky and the changes of the weather in their purity and undefiled beauty. He will see, hear and *feel*—which word I italicize, as implying the psychological as well as the physiological sense, and for this reason: that the phenomena of weather and climate, forming part of our immediate environment, not only exert a profound influence on the mind directly, but also indirectly, by imposing a concomitant modification npon the general tone and appearance of the familar scenes of landscape (or sea-scape) with all the details which constitute them; so that they are thus in a two-fold manner instrumental in affecting the thoughts and emotions of men. And it is by observation of this kind that we are rendered cognizant of the various subtle attributes of weather and climate, which instrumental or verbal data are powerless to convey to us. To give a concrete illustration. A few years ago I made a sojourn among the Cumberland hills, from the middle of summer till far into the darkening days, penetrating into their inmost and wildest recesses—places, I say, black and bare, where the anguish of nature might be seen, felt and heard, in the relentless driving of the sleet, in the distressful bleating of the mountain sheep, and in the hideous distortions of the ragged hawthorns robbed by the fury of wind and weather by the leanness of soil and barrenness of rock, of that sweet commingling and harmonious blending of stubbornness and beauty which characterizes their race, manifesting itself in snowy purity of blossom, as the pride of the June lowlands; and whilst learning, from day to day, what elevated land in a high latitude meant, I began to appreciate more fully than ever before, to what extent the sternness of the elements perceived in the lake-country amid scenes, varying from the most inhospitable loneliness to the utmost loveliness, had its share in moulding and colouring the solemn power of the poetry of Wordsworth. But this leads me to the threshold of a subject of extraordinary interest which I could not, neither with propriety nor adequacy, develop in this article.

(*To be continued.*)

REVIEWS.

Report on the Administration of the Meteorological Department of the Government of India in 1906-07. Calcutta, 1907. Size 13 × 8. Pp. 22.

DR. G. C. SIMPSON was appointed Imperial Meteorologist in succession to Mr. W. L. Dallas, who retired in November, 1906, to be precise "on the forenoon of the 8th." The designations of the chief officials have been changed. The head of the Service (Dr. Walker) is now designated Director-General of Observatories, the next three are termed Imperial Meteorologists, and then follow four in charge of the meteorology of the provinces of Bengal, United Provinces, Bombay and Madras, with the title Meteorologist; the old designation of Meteorological Reporter has been entirely dropped. Kite and balloon observations are being continued, and the observations on snowfall in the Himalayas are being supplemented by large-scale photographs of the snows as seen from Simla, a system which seems to give good results. The seasonal forecasts, which hitherto have been confidential documents, are now published and supplied to the press. Observations at the Andaman Islands are forwarded by wireless telegraphy to the head office in India, and the system worked satisfactorily. Balloon and kite observations at Belgaum have secured important data as to the thickness of the monsoon air currents. The form of the report is sternly official, but it shows an increasing amount of research as well as administrative work.

Recherches expérimentales sur la Résistance de l'Air exécutées à la Tour Eiffel. (Experimental researches on the resistance of air carried out at the Eiffel Tower.) Par G. EIFFEL. Paris: L. Maretheux, 1907. Size, 13 × 10. Pp. 98. Plates.

THE designer of the famous tower at Paris spent a great deal of time between 1903 and 1906 in measuring the resistance of air on falling bodies moving at different velocities, by dropping a weight provided with an ingenions recording device along a vertical cable, extending from the second storey of the tower to the ground, a distance of 320 feet. The result of the experiment was to show that for velocities between 30 and 40 metres (*i.e.*, 100 and 135 feet) per second, the resistance of the air is very nearly proportional to the square of the velocity. The same law must hold good for the resistance of a fixed body to wind, hence the interest of the determination from the point of view of the engineer. The co-efficient of resistance deduced from the experiments is ·074, while nineteen previous experimental determinations which are quoted gave values varying from ·07 to ·125.

Annual Report of the Director Kodaikanal and Madras Observatories for 1906. Madras, 1907. Size, 13 × 8. Pp. 26. *Not for sale.*

THIS report contains a summary of the meteorological observations at Kodaikanal and Madras, including an interesting table of visibility at the former station showing the number of days when the Nilgiri Hills were very clear, visible, just visible, or tops only visible.

Die Niederschlags-Verhältnisse von Deutsch-Südwestafrica [The rainfall conditions of German South-West Africa]. Von DR. EMIL OTTWEILER. From *Danckelmann's Mitteilungen aus den Deutschen Schutzgebieten.* Vol. **20**, Part I. Berlin, 1907. Size, 13 × 9½. Pp. 84. Maps and diagrams.

THIS is an exhaustive study of all existing data bearing on the rainfall of German South-West Africa, a country the extreme aridity of which gives prodigious importance to an accurate knowledge of all the precipitation which falls upon the ground. The first rain gauge was established at Omaruru in Damaraland in December, 1882, but very few stations were in existence before 1890, when military officers and settlers began to reinforce the efforts of missionaries in obtaining information regarding the resources of the country. The records in the German colony are supplemented by those in northern Cape Colony on the south and in southern Angola on the north. Since almost the whole rainfall of the year falls in the late spring, summer and early autumn, *i.e.*, from October to March, Dr. Ottweiler decided to reckon the year from July to June, thus keeping undivided the rainfall of each rainy season. Less than 100 stations supply all the returns available to determine the distribution of rainfall over an area three times as large as the British Isles. The arithmetical means for the various stations are reduced in the usual way by comparison with longer records for other stations; but, naturally, the result is less likely to be accurate than for a European country because the distance of the stations from one another is so great. In some of the tables use is made of colour in a way we have not seen before, and the result is both curious and effective. For instance, in a long table of figures of monthly rainfall the three columns of winter months are distinguished by a wash of blue, the spring months by brown, the summer by red and the winter by purple. In the instance cited the device is the more serviceable on account of the confusion which is apt to overtake a European reader in dealing with the reversed seasons of the southern hemisphere. The memoir is illustrated by several ingenious diagrams and an admirable rainfall map, in which Dr. Ottweiler allows (rightly in our opinion) the configuration of the land to guide the isohyetals where no rainfall figures are available. As giving some idea of the character of the country we may note that the rainfall is less than 2 inches in the year along the coast for a distance of 50 miles inland, and only reaches 10 inches at a distance of about 150 miles from the sea.

Relations between mortality of infants and high temperatures, by DR. E VAN EVERDINGEN, *Koninklijke Akademie van Wetenschappen te Amsterdam.* Reprinted from Proceedings of the meeting of Saturday, October 26th, 1907. Size, 10 × 7. Pp. 14.

WE are grateful to our Dutch friends for their consideration in publishing important papers in the English language. The investigation in question indicated that infant mortality showed hardly any relation to mean monthly temperature, but the number of days with temperature over 77° F., counted for periods from May 15th to June 15th and so on, correspond distinctly with the infant mortality in the months of June, &c. For every day above 77° F. in excess of the average number for the mid-monthly periods the mortality of the month, beginning 15 days later, the death-rate at Groningen is increased 5% and at Utrecht 4% above the mean monthly rate.

Hints to Meteorological Observers in Tropical Africa, with notes on methods of recording lake-levels and a memorandum on the organisation of Meteorological Observations. Published by the authority of the Meteorological Committee. London: Printed for H.M. Stationery Office, 1907. Size, 10 × 6. Pp. 36. Price 9d.

THIS edition has an interesting memorandum, by Dr. W. N. Shaw, on the organization of meteorological observations, adapted for a tropical Colony or Protectorate desirous of establishing a system.

Rapport de la Conférence météorologique internationale. Réunion d'Innsbruck, 1905. Paris, Imprimerie Nationale, 1907. Size, 10 × 6½. Pp. x. + 160.

THE French official report of the Conference of Directors of Meteorological Institutions held in Innsbruck in 1905.

Estudio sobre la Climatologia de La Paz [A study of the climatology of La Paz], par VICTOR E. MARCHANT. La Paz, 1906. Size, 9 × 6. Pp. 48. Plates.

THE author is Chief of the Section of Climatology and agricultural exploration of the Ministry of Agriculture in Bolivia. The city of La Paz is situated in 16° 30′ S., at an elevation of 11,900 feet above the sea on the great Andean plateau of South America. The mean annual temperature (for 6 or 7 years apparently) is given as 50°·4 F., the coldest months being June and July with 45°·3, and the warmest November and March with 53°·9 and 54°·7 respectively. The absolute extremes were 75°·2 on January 17th and 18th, 1903, and 26°·6 on June 4th, 1901. The rainfall varied from 15·88 in. in 1901 to 32·84 in. in 1903.

Bulletin Météorologique du départment de l'Herault publié sous les auspices du Conseil Général. Année 1906. Montpellier, 1907. Size, 11 × 9. Pp. 128 + 12 plates.

THIS annual report is remarkable for the thoroughness and promptitude with which the weather conditions of a small area are recorded and discussed. We note as special features the map of the distribution of thunderstorms, and the systematic treatment of phenological observations.

Beiträge zur Klimatologie und Hydrographie Mittelamerikas. [Contributions to the Climatology and Hydrography of Central America.] Von Dr. ALFRED MERZ. Leipzig : C. G. Naumann. Size 8½ × 6. Pp. 96. Plates. Price 2 marks 60 pf.

DR. MERZ has discussed all the available data bearing on the rainfall and the river flow in the region traversed by the Panama Canal and the neighbouring parts of Central America, much of the material utilized being that collected by the United States Government before they undertook the giant task of completing the Canal. A rainfall map is given, showing the enormous range of isohyetals from 1 metre (say 40 inches) in the interior to 6 metres (about 235 inches) on the east coast at the mouth of the San Juan river. The annnal evaporation amounts to about 43 inches.

Die Meteorologische Elemente und ihre Beobachtung mit Ausblicken auf Witterungskunde und Klimalehre. Unterlagen für Schulgemässe Behandlung sowie zum Selbstunterricht. [The elements of Meteorology and their observation with reference to the study of weather and climate. Arranged for use in schools or private study.] Von OTTO MEISSNER. Leipzig : B. G. Teubner, 1906. Size 10½ × 7. Pp. vi.+94. Illustrations.

A SHORT text-book for use in German schools. The author acknowledges in the preface his indebtedness to the late Prof. von Bezold for reading the book before publication. It is curious, however, to find the wind-scale 1—12 attributed to the *French* Admiral Beaufort; Herr Meissner lays appropriate stress on the derivation of scientific terms from foreign tongues, but here the philological method seems to have led him astray. It is even more curious to find the honoured name of Hann spelled Hamm, and to find amongst the literature quoted no reference to his great *Lehrbuch der Meteorologie.* Despite these little slips, the book is systematically designed, and abounds in fresh and interesting observations.

The Psycho-Physical Aspect of Climate, with a Theory concerning intensities of Sensation. By W. F. TYLER, F.R.Met.Soc., Assoc.Inst. C.E. London: Bale, Son & Danielsson, Ltd. 1907. Size, 10 × 6. Pp. 46. Plates.

IN his preface, Mr. Tyler quotes as a justification for his temerity the following sentence from Mr. H. G. Wells's "Mankind in the Making" :—"There are phases in the development of any science when an incautious outsider may think himself almost necessary, when sketchiness ceases to be a sin, when the mere fact of irresponsibility and untrained interest permits a freshness, a freedom of mental gesture, that would be inconvenient and compromising to the specialist."

We think Mr. Tyler deserves thanks for his courage in endeavouring to estimate the relative intensity of sensations with regard to climate, which we all know to exist and to have little relation to variation in instrumental readings. Some time ago, in 1904, he proposed a classification of climates according to the amount of discomfort experienced in muggy weather, due to moist heat (*hydro-thermos*), and he suggested the term hyther as the measure of mugginess, estimating the amount of hyther from 0 to 10, much as one estimates the force of the wind from 0 to 12. The subject is now elaborated, and this pamphlet, reprinted from the *Journal of Tropical Medicine and Hygiene*, for April 15th, 1907, is well worth reading and thinking over. Mr. Tyler presents his views with a clearness and restraint that command attention and respect.

THE WEATHER OF JANUARY, 1908.

By F. J. BRODIE.

EXPOSED as it was to the rapidly alternating influence of cyclonic and anticyclonic conditions, the weather of January was of an exceedingly changeable character. In the opening days a large high pressure system came down from the northward, and brought with it an instalment of the cold air derived from its place of origin. Between the 1st and the 5th a very sharp frost was, in fact, experienced over the whole kingdom, the minimum temperatures recorded in the screen being below 20° in portions of all but our extreme southern districts, and below 15° at many places situated in the northern and central parts of Great Britain. On the surface of the grass the readings were naturally even lower, the exposed thermometers descending below 10° at a number of stations, and to within a degree of zero at Balmoral. On the 5th the anticyclone withdrew to the southward in the face of a deep depression which advanced towards the Scottish coast, and on the following day a strong south-westerly current of air blowing round the northern disturbance produced a rapid thaw over the entire kingdom, the

morning temperatures of the 6th being in many cases from 20° to 25° higher than that of the 5th. The milder weather was, however, of short duration. After the passage of a deep cyclonic system across Ireland and England on the 7th (when gales and heavy falls of rain or snow occurred over a wide area), a new anticyclone advanced over these islands from the north-westward and the thermometer again fell fast, the readings observed over England between the 9th and 12th being in many instances nearly, if not quite, as low as those recorded a week earlier. In the screen the minima were below 15° in several isolated localities, while on the surface of the grass readings below 10° were equally common, the exposed thermometers falling to 5° at Canterbury and to 3° at Llangammarch Wells. With the rapid departure on the 14th of this second frost the really wintry weather of the month may be said to have come to an end. Sharp touches of cold occurred at various other times, mainly about the 21st, the 29th and the 30th, and the day temperatures were frequently below the average, but no frost of any particular severity was experienced. Between the 18th and 24th, when an anticyclone lay over nearly the whole kingdom, a good deal of thick wet fog prevailed, especially over England, its effect being seen at Nottingham, and possibly in other parts of the Midlands, in a complete absence of bright sunshine during the week ending the 25th. Towards the close of the month the weather was influenced, on the other hand, by large cyclonic disturbances which passed along from Iceland to Scandinavia. Strong winds or gales from south-west or west were now experienced over nearly the whole of the United Kingdom, with mild weather between the 23rd and 27th, but with colder weather and showers of snow as the wind subsequently veered to the north-westward.

For the month as a whole, the mean temperature was a little above the average in Scotland and the north of Ireland, but below it in nearly all the English districts. At the London observing station of the Meteorological Office (in St. James's Park) the mean temperature was the lowest in January since the year 1897, and the absolute minimum of 20° on the 6th the lowest since 1895. On the west and south coasts of Great Britain the total duration of bright sunshine was largely in excess of the average, but at many places in the north it was slightly below the normal.

METEOROLOGICAL NEWS AND NOTES.

PROFESSOR G. HELLMANN, Director of the Royal Prussian Meteorological Institute, will deliver a lecture on "The Dawn of Meteorology," at the meeting of the Royal Meteorological Society, on Wednesday, March 11th, in the rooms of the Institution of Civil Engineers. Dr. Hellmann has devoted particular attention to the early history of Meteorology, and is the leading authority on the subject.

MR. G. W. C. SHIELD, who was the printer of this Magazine and of *British Rainfall* from their foundation, died, we regret to have to record, on 28th January, at the age of 79. Mr. Shield was an early friend of Mr. Symons, and took a deep interest in the work of the British Rainfall Organization. His admirable accuracy as a printer greatly facilitated the mechanical work of editorship, and his unfailing kindness saved the reputation for punctuality in appearance of this Magazine by helping us through many tight places when the urgency of our other work delayed the dispatch of copy or proofs to the eleventh hour, or beyond. Three years ago Mr. Shield communicated a few reminiscences of his connection with our publications, which appeared on p. 2 of Vol. **40**, and he lived to complete a full half-century of association with rainfall work, as, if we are not mistaken, he printed the forms for the Thunderstorm enquiry which was the first piece of Mr. Symons's independent work in 1858.

MR. A. WATT, Meteorological Secretary of the Scottish Meteorological Society, will deliver a lecture on the Climate of the British Isles to the Royal Scottish Geographical Society, in Edinburgh, on February 19th, and later to the branches of the Society in Glasgow, Aberdeen and Dundee.

A CONFERENCE OF IMPERIAL AND COLONIAL METEOROLOGISTS has been convened by the Royal Society of Canada, to meet at Ottawa in May, at which it is hoped representative meteorologists from the United Kingdom and from the British Dominions beyond the Seas may attend and discuss matters relating to the larger problems of meteorology in which the various dominions could advantageously co-operate. The date is one at which it is difficult for many meteorologists to get away from routine work, and perhaps if the meeting could have been postponed to 1909, when the British Association will visit Canada, the attendance would probably have been larger. We wish the meeting all success.

METEOROLOGICAL OBSERVATIONS AT TRISTAN D'ACUNHA, the lonely mid-Atlantic islet in 37° S., have, we understand, been undertaken by the Rev. Mr. Barrow, at the instance of the South African Philosophical Society. A complete second-order station has been established, and the observations will, it is hoped, throw light on many problems connected with the weather of South Africa and the atmospheric circulation of the world. The importance of this station will be enhanced by the observations which are being kept up by the government of the Argentine Republic in the Atlantic islands nearer the antarctic circle.

THE MONTEVIDEO METEOROLOGICAL SOCIETY (*Sociedad Meteorologico Uruguaya*) has been re-constituted under the title of the *Instituto Nacional Fisico-Climatologico*, its headquarters remaining at Montevideo.

RAINFALL TABLE FOR JANUARY, 1908.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea.	RAINFALL OF MONTH.	
					Aver. 1870-99.	1908.
		° ′	° ′	ft.	in.	in.
Camden Square	*London*	51 32	0 8	111	1·89	1·93
Tenterden	*Kent*	51 4	*0 41	190	2·36	1·64
West Dean	*Hampshire*	51 3	1 38	137	2·68	1·41
Hartley Wintney	,,	51 18	0 53	222	2·39	1·52
Hitchin	*Hertfordshire*	51 57	0 17	238	1·81	1·41
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	2·05	1·94
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	1·70	·89
Brundall	*Norfolk*	52 37	*1 26	66	1·67	·98
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	3·90	1·50
Torquay (Cary Green)	*Devon*	50 28	3 32	12	3·19	1·26
Polapit Tamar [Launceston]	,,	50 40	4 22	315	3·87	2·24
Bath	*Somerset*	51 23	2 21	67	2·52	1·24
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·46	1·58
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·81	1·41
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·34	·77
Boston	*Lincolnshire*	52 58	0 1	25	1·59	·97
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	1·74	1·02
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	1·95	1·13
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	3·38	3·87
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	1·89	1·26
Arncliffe Vicarage	,, ,,	54 8	2 6	732	6·33	6·59
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	1·80	1·35
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	1·96	1·46
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	14·71	16·82
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	3·85	2·73
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	5·13	3·07
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	3·87	3·84
Llandudno	*Carnarvon*	53 20	3 50	72	2·57	2·53
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	4·54	5·02
Hawick (Branxholm)	*Roxburgh*	55 24	2 51	457	3·19	3·45
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	...	2·17
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	4·92	5·25
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	3·25	4·68
Tighnabruaich	*Argyll*	55 55	5 14	50	5·86	6·95
Mull (Quinish)	,,	56 36	6 13	35	5·85	6·02
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·10	1·61
Braemar	*Aberdeen*	57 0	3 24	1114	2·91	2·56
Aberdeen (Cranford)	,,	57 8	2 7	120	2·32	1·44
Cawdor	*Nairn*	57 31	3 57	250	2·14	2·09
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	5·10	5·28
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	8·75	11·20
Dunrobin Castle	*Sutherland*	57 59	3 56	14	2·62	3·37
Castletown	*Caithness*	58 35	3 23	100	...	2·61
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	6·57	4·48
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	4·06	2·42
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	2·98	2·86
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	3·14	3·22
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·16	2·06
Ballinasloe	*Galway*	53 20	8 15	160	3·49	3·36
Clifden (Kylemore House)	,,	53 32	9 52	105	7·86	7·32
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	5·00	7·13
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	3·61	4·44
Seaforde	*Down*	54 19	5 50	180	3·63	2·66
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	3·56	3·17

RAINFALL TABLE FOR JANUARY, 1908—*continued.*

RAINFALL OF MONTH (*con.*)					RAINFALL FROM JAN. 1.				Mean Annual 1870-1899.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours. in.	Max. in 24 hours. Date.	No. of Days	Aver. 1870-99. in.	1908. in.	Diff. from Aver. in.	% of Av.	in.	
+ ·04	102	1·38	7	10	...	...	...	...	25·16	Camden Square
— ·72	69	1·31	7	12	...	...	...	...	28·36	Tenterden
—1·27	53	·73	7	13	...	...	...	...	29·93	West Dean
— ·87	64	1·10	7	13	...	...	...	...	27·10	Hartley Wintney
— ·40	78	·69	7	11	...	...	...	...	24·66	Hitchin
— ·11	95	1·39	7	14	...	...	...	...	26·75	Addington
— ·81	52	·26	7	13	...	...	...	...	25·39	Westley
— ·69	59	·15	7	20	...	...	...	...	25·40	Brundall
—2·40	38	·58	7	16	...	...	...	...	39·00	Winterbourne Stpltn
—1·93	39	·47	7	12	...	...	...	...	35·00	Torquay
—1·63	58	·82	7	16	...	...	...	...	38·85	Polapit Tamar
—1·28	49	·61	7	13	...	...	...	..	30·75	Bath
— ·88	64	·84	7	15	...	...	...	...	29·85	Stroud
—1·40	50	·26	6	17	...	...	...	...	33·04	Wolstaston
—1·57	33	·19	5	12	...	...	...	...	29·21	Coventry
— ·62	61	·27	5	8	...	...	...	...	23·30	Boston
— ·72	59	·30	8	13	...	...	...	...	24·70	Hodsock Priory
— ·82	58	·29	6	16	...	...	...	...	26·18	Derby
+ ·49	114	·83	26	16	...	...	...	...	42·43	Bolton
— ·63	67	·33	6	12	...	...	...	...	26·96	Ribston Hall
+ ·26	104	1·44	26	15	...	...	...	...	60·96	Arncliffe Vic.
— ·45	75	·28	8	16	...	...	...	...	27·02	Hull
— ·50	74	·80	7	12	...	...	...	...	27·99	Newcastle
+2·11	114	3·30	15	18	...	...	...	...	132·68	Seathwaite
—1·12	71	·60	16	19	...	...	...	...	42·81	Cardiff
—2·06	60	·79	7	16	...	...	...	...	47·88	Haverfordwest
— ·03	99	·93	15	16	...	...	...	...	45·41	Gogerddan
— ·04	98	·48	6	16	...	...	...	...	30·98	Llandudno
+ ·48	110	·84	15	14	...	...	...	...	43·43	Cargen
+ ·26	108	1·20	8	16	...	...	...	...	34·80	Branxholm
...	...	1·07	7	12	...	...	...	...	...	Edinburgh
+ ·33	107	·95	5	19	...	...	...	...	48·87	Girvan
+1·43	144	·67	7	18	...	...	...	...	35·80	Glasgow
+1·09	119	·98	25	18	...	...	...	...	57·90	Tighnabruaich
+ ·17	103	·81	14	19	...	...	...	...	57·53	Quinish
— ·49	77	·86	7	17	...	...	...	...	28·95	Dundee
— ·35	88	...	...	...	...	...	...	...	36·07	Braemar
— ·88	62	·67	7	14	...	...	...	...	33·01	Aberdeen
— ·05	98	·31	17	14	...	...	...	...	29·37	Cawdor
+ ·18	104	·74	25	20	...	...	...	...	43·71	Fort Augustus
+2·45	128	1·97	25	22	...	...	...	...	86·50	Bendamph
+ ·75	129	·75	27	13	...	...	...	...	31·60	Dunrobin Castle
...	...	·49	5	21	...	...	...	...	...	Castletown
—2·09	68	1·36	17	21	...	...	...	...	58·11	Killarney
—1·64	60	·54	15	21	...	...	...	...	39·30	Waterford
— ·12	96	·45	6	21	...	...	...	...	33·47	Hurdlestown
+ ·08	103	·78	6	19	...	...	...	...	35·19	Abbey Leix
— ·10	95	·71	6	16	...	...	...	...	27·75	Dublin
— ·13	96	·73	6	20	...	...	...	...	37·04	Ballinasloe
— ·54	93	1·10	6	18	...	...	...	...	80·23	Kylemore House
+2·13	143	·88	6	23	...	...	...	...	50·50	Enniscoe
— ·83	123	·60	6	20	...	...	...	...	41·83	Markree Obsy.
— ·97	73	·61	7	15	...	...	...	...	38·61	Seaforde
— ·39	89	·41	25	21	...	...	...	...	41·20	Londonderry

SUPPLEMENTARY RAINFALL, JANUARY, 1908.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	1.99	XI.	Rhayader, Tyrmynydd	3·13
,,	Ramsgate	1·84	,,	Lake Vyrnwy	4·51
,,	Steyning	2·03	,,	Llangyhanfal, Plâs Draw	2·68
,,	Hailsham	1·87	,,	Criccieth, Talarvor	3·70
,,	Totland Bay, Aston House	·95	,,	Llanberis, Pen-y-pass	...
,,	Emsworth, Redlands	1·02	,,	Lligwy	3·35
,,	Stockbridge, Ashley	1·64	,,	Douglas, Woodville	3·62
,,	Reading, Calcot Place	1·57	XII.	Stoneykirk, Ardwell House	2·76
III.	Harrow Weald, Hill House	1·81	,,	Dalry, The Old Garroch	8·89
,,	Oxford, Magdalen College	1·55	,,	Langholm, Drove Road	6·78
,,	Pitsford, Sedgebrook	1·10	,,	Moniaive, Maxwelton House	5·76
,,	Huntingdon, Brampton	1·09	XIII.	N. Esk Reservoir [Penicuick]	4·50
,,	Woburn, Milton Bryant	1·57	XIV.	Maybole, Knockdon Farm	4·19
,,	Wisbech, Bank House	·87	XV.	Campbeltown, Witchburn	4·51
IV.	Southend Water Works	1·00	,,	Inveraray, Newtown	9·67
,,	Colchester, Lexden	·62	,,	Ballachulish House	10·74
,,	Newport, The Vicarage	1·10	,,	Islay, Eallabus	4·26
,,	Rendlesham	·58	XVI.	Dollar Academy	4·61
,,	Swaffham	·94	,,	Loch Leven Sluice	4·59
,,	Blakeney	·84	,,	Balquhidder, Stronvar	9·09
V.	Bishops Cannings	2·02	,,	Perth, Pitcullen House	1·89
,,	Ashburton, Druid House	2·51	,,	Coupar Angus Station	2·02
,,	Honiton, Combe Raleigh	1·40	,,	Blair Atholl	2·50
,,	Okehampton, Oaklands	2·93	,,	Montrose, Sunnyside Asylum	1·81
,,	Hartland Abbey	1·90	XVII.	Alford, Lynturk Manse	1·69
,,	Lynmouth, Rock House	2·10	,,	Keith Station	1·95
,,	Probus, Lamellyn	1·38	XVIII.	N. Uist, Lochmaddy	4·02
,,	North Cadbury Rectory	1·15	,,	Alvey Manse	2·06
VI.	Clifton, Pembroke Road	1·76	,,	Loch Ness, Drumnadrochit	3·74
,,	Ross, The Graig	·72	,,	Glencarron Lodge	10·44
,,	Shifnal, Hatton Grange	1·27	,,	Fearn, Lower Pitkerrie	1·24
,,	Blockley, Upton Wold	1·39	XIX.	Invershin	3·27
,,	Worcester, Boughton Park	·68	,,	Altnaharra	4·26
VII.	Market Overton	·96	,,	Bettyhill	2·95
,,	Market Rasen	1·34	XX.	Dunmanway, The Rectory	6·42
,,	Bawtry, Hesley Hall	·61	,,	Cork	2·52
,,	Buxton, Lismore House	3·02	,,	Darrynane Abbey	4·92
VIII.	Neston, Hinderton Lodge	1·56	,,	Glenam [Clonmel]	2·24
,,	Southport, Hesketh Park	1·95	,,	Ballingarry, Gurteen	3·10
,,	Chatburn, Middlewood	5·95	,,	Miltown Malbay	4·56
,,	Cartmel, Flookburgh	4·27	XXI.	Gorey, Courtown House	1·86
IX.	Langsett Moor, Up. Midhope	4·11	,,	Moynalty, Westland	3·17
,,	Scarborough, Scalby	2·03	,,	Athlone, Twyford	2·65
,,	Ingleby Greenhow	1·29	,,	Mullingar, Belvedere	3·54
,,	Mickleton	2·12	XXII.	Woodlawn	3·82
X.	Bardon Mill, Beltingham	2·17	,,	Westport, St. Helens	4·66
,,	Ewesley, Fallowlees	1·70	,,	Mohill	3·28
,,	Ilderton, Lilburn Cottage	1·82	XXIII.	Enniskillen, Portora	3·21
,,	Keswick, York Bank	5·97	,,	Dartrey [Cootehill]	2·76
XI.	Llanfrechfa Grange	2·09	,,	Warrenpoint, Manor House	2·76
,,	Treherbert, Tyn-y-waun	8·35	,,	Banbridge, Milltown	2·09
,,	Carmarthen, The Friary	3·88	,,	Belfast, Springfield	3·55
,,	Castle Malgwyn [Llechryd]	2·41	,,	Bushmills, Dundarave	2·70
,,	Plynlimon	12·20	,,	Stewartstown, The Square	2·13
,,	Crickhowell, Ffordlas	2·20	,,	Killybegs	6·28
,,	New Radnor, Ednol	1·76	,,	Horn Head	3·47

METEOROLOGICAL NOTES ON JANUARY, 1908.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

LONDON, CAMDEN SQUARE.—In the first two weeks two short spells of severe frost occurred, separated by a sudden thaw and 1·38 in. of R on 7th, the heaviest daily fall in January since the record started in 1858. In the latter half anticyclonic conditions prevailed, and dense fogs were frequent, but the temp. was considerably higher. Fine and bright after 27th. Mean temp. 36°·7, or 1°·4 below the average. Duration of sunshine 32·5* hours, and of R 34·6 hours.

WEST DEAN.—A cold and variable month, with R less than half the average. The temp. was low and there was an unusual amount of fog. S on 6, and fog on 12, days.

WINTERBOURNE STEEPLETON.—The night temp. was very low in the first half, and there was an unusual amount of fog in the latter half. The mean temp. was 2°·3 below the average of 15 years.

TORQUAY.—Duration of sunshine 62·8* hours, or 2·2 below the average. Mean temp. 41°·4, or 1°·0 below the average.

NORTH CADBURY.—A month of violent and remarkable changes many days being warm and bright, and many dismal or foggy. The R was less than half the average, and the wind normal with no great gale. Between 5th and 6th a rise of 30° of temp. occurred in 13 hours.

BOLTON.—Generally dull, foggy and damp. Duration of sunshine 8·7* hours, being 12·2 hours below the average, and the lowest on record for January; 23 sunless days. The earth temp. was the lowest since 1895. S fell on two days and H was frequent.

SOUTHPORT.—Very sunny and rather dry, with high bar. There were notable day to day changes of temp., unprecedented in 36 years. Mean temp. 36°·8, or 1°·8 below the average. Duration of sunshine 55·3* hours, or 14·0 above the average. R ·75 in. below the average; duration 45·4 hours.

HAVERFORDWEST.—Cold and frosty generally till 12th, then mild and changeable. The R was moderate, and there was much fog. Duration of sunshine 75·9* hours.

DOUGLAS.—An unusually disagreeable month for the almost unbroken spell of cold winds of great strength and much wet weather. There were, however, six brilliantly fine frosty days.

DUMFRIES.—Remarkable for extremely changeable weather, keen frost being suddenly followed by high temp. There was little sunshine, and when not raining it was damp and muggy. Farm work was well advanced.

COUPAR ANGUS.—The R and mean temp., 35°·9, were both practically the average values. The coldest period occurred during the first week. There were several N.W. gales.

DRUMNADROCHIT.—R ·02 in. below, and rain days 1 above, average of 22 years.

CASTLETOWN.—Except for a W. gale on 6th it was fine to 25th, with S.W. winds and a good deal of sunshine. From that date R, H and S showers continued to the end. Whole W. gale, force 10, on 30th and 31st.

DUNMANWAY.—Wet on the whole, with fine cold intervals. Frost on first four days and from 9th to 11th. Skating was possible on flooded fields.

CORK.—R 1·71 in. below, and mean temp. 3°·2 below the average.

MILTOWN MALBAY.—Intense frost to 4th, when, after a thaw, there was 1·40 in. of R in one continuous fall. Light frosts, succeeded by heavy R, prevailed nigh a fortnight; thence to the end was cold.

DUBLIN.—Very cold during the first five days; on 5th the temp. rose briskly. This warm wave was transitory, but a second set in on the 13th lasting till 17th, and another from 22nd to 27th. Mean temp. 41°·5.

KYLEMORE.—Wild and stormy, with black frost at the beginning and much R towards the end.

* Campbell-Stokes.

Climatological Table for the British Empire, August, 1907.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Absolute. Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	78·3	4	44·1	2	70·6	52·4	53·6	77	120·7	41·2	1·94	13	...
Malta	94·1	12	69·9	24,27	84·8	73·6	66·5	70	150·0	...	...	...	1·0
Lagos	84·2	30,31	68·0	8	81·6	71·5	70·4	77	164·0	62·0	1·29	2	8·6
Cape Town	81·8	15	40·6	5	64·1	47·3	48·5	79	...	...	1·49	8	4·4
Durban, Natal ...	87·6	12	45·7	4	77·3	55·2	...	...	139·8	...	·01	1	1·3
Johannesburg	75·8	30	34·1	4	66·4	45·9	40·4	60	133·7	29·8	·00	0	0·8
Mauritius	77·3	27,29	49·9	8	75·1	58·7	55·5	68	141·8	40·0	·12	3	6·0
Calcutta...	92·3	6	75·5	18,19	88·4	79·1	77·8	86	159·0	74·0	10·05	18	8·3
Bombay...	85·3	1	74·6	13	82·9	77·1	75·4	86	131·1	72·3	15·93	30	9·2
Madras	101·0	20	73·6	11	96·9	78·7	71·5	67	151·2	72·4	4·08	19	6·4
Kodaikanal	64·6	18	49·3	27	61·1	51·8	51·0	88	135·1	45·3	6·36	27	8·3
Colombo, Ceylon ...	87·1	24	73·0	13	85·0	76·3	73·4	81	154·5	70·2	1·76	13	6·0
Hongkong	91·6	29	74·5	12	86·7	78·3	75·5	81	142·7	...	14·86	17	6·2
Melbourne	66·7	1	38·5	28	60·1	45·2	42·9	72	123·2	29·4	1·97	13	6·1
Adelaide	73·3	30	39·9	17	62·3	46·6	45·7	72	124·7	36·4	1·81	16	5·1
Coolgardie	...	...	...	...	...	...	...	...	...	...	...	...	...
Sydney	75·4	27	42·0	18	65·3	47·4	41·3	67	109·1	32·0	·29	13	2·9
Wellington	59·0	10	33·0	4	53·6	43·3	42·1	79	103·0	24·0	4·13	17	6·8
Auckland	63·0	7	40·0	4	57·2	47·5	45·2	77	118·0	35·0	...	...	5·7
Jamaica, Negril Point.	89·9	4	69·2	18	87·8	71·9	72·2	76	...	...	9·00	18	6·4
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	...
Grenada	86·2	3	71·0	12	84·1	73·5	72·9	79	140·6	...	5·71	25	5·0
Toronto	87·0	11	47·8	23	76·2	54·4	...	...	105·5	43·7	1·09	5	3·7
Fredericton	84·3	13	40·5	23	72·7	51·4	...	75	...	...	3·81	15	6·0
St. John's, N.B. ...	73·2	12	50·0	27	66·1	54·3	...	...	...	...	3·92	14	5·8
Victoria, B.C.	78·1	20	43·7	12	...	...	...	...	...	...	·23	7	5·0
Dawson	79·0	11	30·0	25	67·4	40·9	...	...	...	...	1·28	9	6·0

MALTA.—Mean temp. of air 78°·7.

JOHANNESBURG.—Bright sunshine 339 hours or 98 °/₀ of the possible amount.

Mauritius.—Mean temp. of air 1°·6, of dew point 3°·9, relative humidity 6·7 per cent., and R 2·07 in., below, averages. Mean hourly velocity of wind 9·9 miles, or 2·4 miles below average.

KODAIKANAL.—Bright sunshine 72 hours.

COLOMBO.—Mean temp. of air 79°·9 or 0°·9 below, of dew point 0°·2 above, and R 1·84 in. below, averages. Mean hourly velocity of wind 7·1 miles.

HONGKONG.—Mean temp. of air 81°·9. Bright sunshine 222·5 hours. Mean hourly velocity of wind 11·7 miles.

Adelaide.—Mean temp. of air 0°·6 above, and R ·54 in. below, averages, and sunshine 6 hours above average.

Sydney.—Mean temp. of air 1°·8 above, and R 2·87 in. below, averages.

Wellington.—Mean temp. of air 0°·1 below, and R ·82 in. below, averages. Fogs on two nights.

Auckland.—Wet and stormy, strong gales on two days. R 2·22 in. above average.